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Salted Paper

history and practice

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Salted paper: history and practice

Salted paper is one of the the oldest photographic printing media. It goes back to the pre-existence of photography, well before the latter became what it promised to be: a means of pictorial reproduction of the world around us through the mere action of light on some support. Before its "photographic" use this paper served indeed to reproduce line drawings, and to make photograms of natural objects put directly on the sensitive paper. Yes, the printing negative didn't exist yet!

From a technical point of view, photography takes advantage of the property that some materials have to react significantly and rather fast to the action of light. The first - and the most effective - of these materials to be used, and still continuing so till today, are the silver halides.

Silver halides are compounds formed between silver and one of the halogens — bromine, chlorine, iodine, or fluorine. Silver in its raw metal form is barely used in photography (daguerreotypes); it usually is reacted with nitric acid to produce an inorganic compound with chemical formula AgNO_3 , dissolving in numerous solvents, including water, and easily combined with other products. It is far less sensitive to light than the halides. To increase its sensitivity, the silver nitrate is treated with halide salts, and amongst them the chlorine contained as chlorides in sea or table salt was the easiest to find.

This is why the pioneers of photography used at first silver chloride (silver nitrate + sodium chloride) as the agent sensitive to light, immediately blackening when exposed to it.

Salted paper is nothing else than ordinary paper coated with common table salt and silver nitrate in excess, necessary to activate the appearance of the image within a few minutes, or even seconds, under the action of light.

This paper is surprisingly simple to make, and above all it has an extremely soft rendering which is due to the diffusion of the image within the paper fibers.

Below are described the steps of making salted paper, an historical paper with remarkable qualities.

First, the **list of what is needed** to prepare and process salted paper, as described in the books from the early times:



- Sodium chloride (sea salt)
- Distilled Water
- Silver Nitrate
- Citric acid (optional)
- Sodium hyposulphite

Add to this 3 trays slightly larger than the paper, a precision balance, an ultraviolet light source (or a simple glass plate for sunprinting), and of course a big negative.

In the modern books that you might find on the subject, the recipes may include the sizing of the paper with gelatin, the adding of potassium dichromate to prevent the loss of image intensity at the fixing stage, as well as the adding of other products.

As far as I am concerned, the simpler formula of the origins always gave me the best

results, as it involves less manipulations, and therefore less error risks since the work is done properly and methodically. (I have to stress, however, that success with all these old photographic processes requires a feeling and skills coming only with practice.)

I start preparing the **first bath**, used to soak the paper in a saline solution (sodium chloride). For this, I weigh 20 grams of salt (preferably sea salt, which is purer: table salt contains other products that may cause inconsistent results).



I pour one liter of hot water in a tray and sprinkle 20 grams of salt on it.

Once the salt dissolved, I quickly immerse a first sheet of paper in this saline solution maintained at a temperature of 40 ° C.



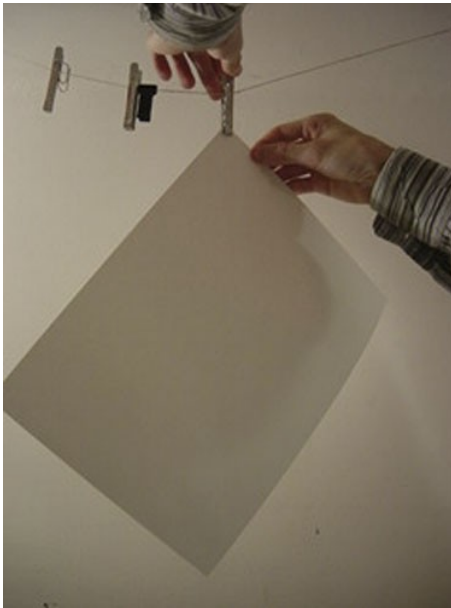
I always make sure to eliminate any air bubbles that might remain on the surface of the paper as they would prevent the salted solution to be absorbed by the paper, and cause micro white spots on our final print. (I float the sheet on the solution, with its smooth surface – which is going to receive the image – down).

Prefer a heavy paper of good quality. It is more expensive but the result will be much better.

After 3 minutes of immersion in the salted solution, I remove the sheet, squeezing it gently on the edge of the tray, and I hang it to dry by a corner with one single stainless steel peg. After a minute or two, I remove the drop of salted water formed at the bottom corner of the sheet with a paper towel.

As I am usually salting multiple sheets at once, the drying is done naturally in the open air; but using an hairdryer to accelerate drying is allowed, of course.





While the paper is drying, I prepare the **acid, silver nitrate based sensitizer**. For this I weigh 100 grams of distilled water to which I add 10 grams of silver nitrate and 0.5 grams of citric acid. These products are routinely available in pharmacies. Citric acid, according to some books, increases the contrast of the image... After several tests, I found no difference when using the sensitizer with or without acid. Its primary role is to preserve the silver nitrate solution when it is being reused.

Sensitizing (under low artificial light!):

Once the salted paper dry, I have to sensitize it. To do this, I simply use a brush from which I removed the metal ring in order to avoid any adverse reaction with the silver nitrate, as this could cause indelible stains on the print. So, the use of brushes without any metal parts is highly recommended.



Traditionally, the paper sheets were floated directly onto the acid silver nitrate solution. I would not recommend this, considering that a liter of solution requires 100 grams of silver nitrate, and considering the cost of the latter ...



The brush therefore is a worthwhile alternative, not only for those economic reasons, but also for the specific use I make of it. Indeed, using a brush allows me to sensitize exactly the required area of the sheet while giving its borders the "handmade" aspect I am after.

My recommendation is that you wear gloves when handling silver nitrate, because it causes indelible black stains on the skin, which will only disappear with the renewal of the epidermis. (Do not work bare handed, as I do ... I'm a bad example)

Photographic chemistry: When the silver nitrate solution comes into contact with salt (sodium chloride), silver chloride is formed, which is very sensitive to light. So, our paper gets instantly impregnated with silver chloride and an excess of dissolved silver nitrate. This excess is essential for our purpose, as this is what is going to provide the material necessary to the deep blackening of the silver chloride. I do not refrain from applying several layers of silver nitrate solution, passing the brush in all directions over and over again, making sure not to forget any area of the sheet that will be exposed.

As for the citric acid, it is useful for the preservation of the sensitizer. As I only prepare just enough solution for a single session, this demo excepted, I confess that I usually do not add it.

Our photographic paper is now almost ready; we only have to **let it dry**, preferably at a very low ambient light level (and certainly not in daylight, which is very rich in UV rays), or even in total darkness to avoid fogging. Again, using a hair dryer can't harm.

While the sensitive paper is drying, I **prepare the fixer** whose function is to remove all silver chloride salts that were not used to form the image: subsisting unused salts would cause the progressive darkening of the clear image parts under the influence of ambient light.

For this, I weigh 200 grammes of sodium hyposulphite (now known as sodium thio-sulphate). I sprinkle these 200 grams in a liter of cold water.

Please note: I do not recommend the use of the commercial fixer brands as they are made from acetic acid and especially ammonium thiosulphate, which is much stronger than sodium thiosulphate. Even at high dilution, these fixers cause a significant loss of the print's density.



I put the fixer tray aside for later use.

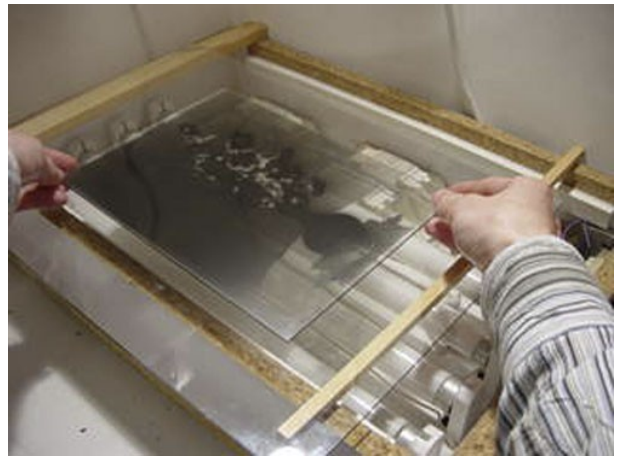
It's time now to **print** the negative. In this case, it was a 18x24 cm glass plate with a silver bromide gelatin emulsion; quite contrasty, it was especially made for being printed on salted paper.

Please note: salted paper requires a negative with more contrast than a negative intended for "normal" printing.

Of course, few people are taking the time to make their light-sensitive plates from scratch, as I do. That is why boxes of orthochromatic sheet film are being sold. These are sheet films - a transparent polyester substrate coated with a black and white emulsion to be handled under red safelighting. You can use them to make a positive duplicate of your negative and enlarge it on a sheet of "ortho" film. You will have a big negative, well suited for printing on salted paper. This involves quite some manipulations, but that is the price to pay if you do not have a large format camera. You might also use a large paper negative made on a sheet of RC photo paper, but then you will have to adopt longer exposure times, as the UV rays will have to pass through a thicker, less transparent layer of laminated paper before reaching the printing paper.



I use a bank of fluorescent U.V tubes for printing. The silver chloride which permeates the paper reacts very quickly to ultraviolet rays. If you do not have a UV lighting device, you can still print under the sun: daylight is rich in U.V. rays. The printing method used here is called "contact print" because the negative is closely in contact with the light-sensitive paper. This explains the need for a negative of the same size as the final print. The opaque parts of the negative prevent the rays from blackening the paper while the transparent parts allow the exposure to light. So I put my negative on the glass plate of the U.V. bank (*This is an upwards lighting bench - ed.*). I make sure to put the negative with its emulsion side above. I then place on it the paper with its sensitized face down, directly in contact with the negative. Both



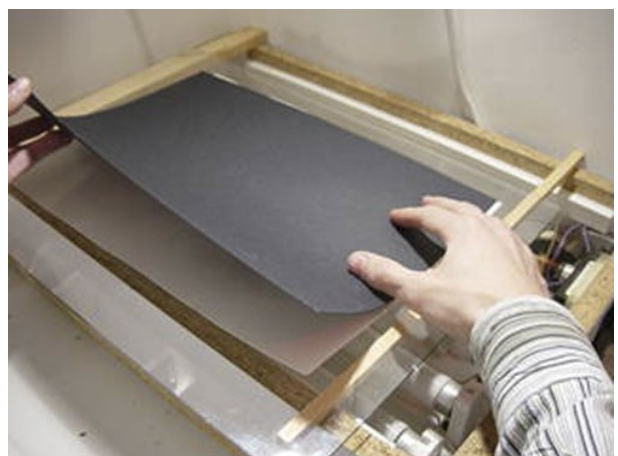
"emulsion" sides are thus in close contact. On top of the sensitive paper, I put a sheet of black cartoline to avoid any stray light, reflected from the upper pressing plate, that could darken a possible drop of silver nitrate that might have dried on the back of the paper at the sensitizing stage.



Finally I put a really flat plate on the sandwich, to make sure that the negative is kept in close contact with the paper (you might even add some weight on top of it: a couple of very heavy books for instance). Now everything is ready for exposure.

It is difficult to give a precise exposure time. This is based on the density of the negative, the intensity of the U.V. radiation, the desired effect, and the distance between the negative and the light source.

In my case, 4 to 5 minutes are necessary to get a print with "normal" exposure. If your source U. V. is above the negative, you even have the possibility to modulate the exposure of certain areas of the image, as with an enlarger for traditional printing.



After 5 minutes of exposure, there is no need for development; the image is already there, in its wonderful softness, its unique

rendering of contours and relief, its purplish brown colour.

Please note:

Those 5 minutes include a slight overexposure, as the steps of the first rinse and fix always cause a slight loss of overall density.

The paper has now to be processed in order to **ensure its permanence**. To do this, immediately after exposure and before fixing the excess of silver nitrate which is still in the paper fibers has to be removed.



If this was not done, the fixer would cause fogging and a really unpleasant color on the whole image. I therefore prepare a large tray filled with cold water and I put the exposed paper on its surface, image side down.

I allow the sheet to float on the water for about thirty seconds. When lifting it, a white precipitate will be visible in the water, as shown in the picture on the left. This is the silver nitrate which started to leak out of the paper.

My method to speed up this clearing is to avoid a complete immersion of the paper in the beginning, so that the leaking silver nitrate cannot penetrate the backside fibers of the sheet.

This first soak is what removes most of the silver nitrate.

In the following baths, I immerse the sheet completely and I continue renewing the water as long as it shows a cloudy precipitate. Notice the color shift of the image.



It shifted towards an orangy colour. Once the rinse water isn't getting cloudy any more, all of the silver nitrate content is removed from the sheet .

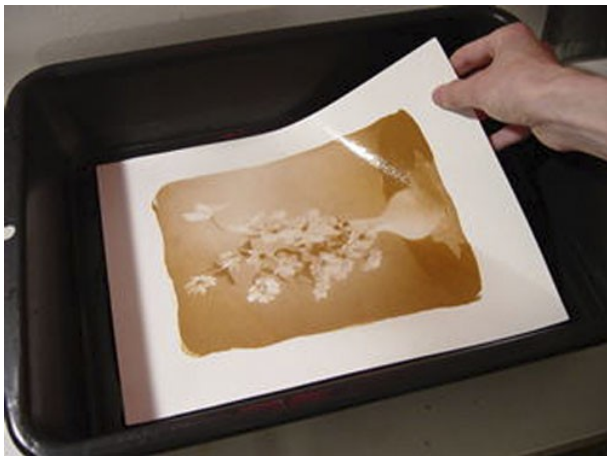
The next stage is the fixing. I dip the paper into the tray I did put aside previously.

Please note:

In this sodium hyposulphite solution, the image will gain some density in the shadows, but lose some detail (remember: we overexposed). In a commercial fixing solution, the picture's colour would shift from orange to dark yellow and lose a lot of density and detail!



After fixing the print for 10 to 15 minutes, I **wash the paper thoroughly** for 2 hours, which will remove all traces of sodium hyposulphite from the paper fibers.



For this, I go through a cycle of 12 cold water renewals, each of these taking 10 minutes.

Any remaining trace of sodium hyposulphite in the paper would cause yellowing over time, hence the need for a thorough washing.

This being completed, I finally can let the paper dry quietly in the open air.

At this stage, the tones of the image will change again: the colour will become cooler and the density, higher.

Once the image is completely dry, it will appear quite similar to its look immediately after exposure. It is possible to change the colour of the image in a gold chloride toner, but that's another story..



In the meantime, we can marvel at the simplicity of this process and its quite unique rendering. The best satin printing papers are unable to equal the beautiful "charcoal" look of salted paper – which cannot be shown on a computer screen either (especially when the digital shooting is a bit sloppy, with burnt highlights ... I'm sorry, but digital tools require skills I do not have..).



* Quite some small tricks of the trade can not be discussed here... I can organize introductory workshops at the "Musée du Cinéma et de la Photographie" in Saint-Nicolas-de-Port (54), if you are living nearby and interested – please contact me at:

Cinema.musee@wanadoo.fr

or directly through the museum's website:

<http://www.museecinemaphoto.com>

Finally, below are some prints made by following the method described above. The negatives were of course 18x24cm glass plates, with their gelatin-bromide emulsion similar to the one used in the early times ... This is what explains the very special rendering of nature and light.



We would like to thank Mr Lionel Turban, who accepted to have his original document translated and distributed by Picto Benelux. The original document can be found at <http://disactis.com/papiersale/papiersale.php> . The information included really deserves the widest possible publication. Lionel Turban runs Disactis.com , an organization which distributes chemicals and equipment for handicraft photography.
<http://www.disactis.com/> - <http://www.facebook.com/pages/Disactiscom/180056815419168>

Picto Benelux is an informal group, open to everybody in the Benelux countries having an active interest in photographic processes developed from the very beginning of Photography. The aim is to revisit them, while respecting anyone's creative approach.
<http://www.picto.info/>

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